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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,616	10/14/2003	Srinivasan Venkatesan	2091	4227

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EXAMINER	
WARTALOWICZ, PAUL A	
ART UNIT	**PAPER NUMBER**
1754	

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/684,616	VENKATESAN ET AL.	
	Examiner	Art Unit	
	Paul A. Wartalowicz	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *14-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 6, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al..(U.S. 6534033) in view of Peterson et al. (U.S. 4696806).

Amendola et al. teach a process for a hydrogen generation system (col. 3, lines 20-25) comprising a reservoir containing fresh metal hydride solution (col. 14, lines 31-35), and a pumping fresh metal hydride into a catalytic chamber (col. 14, lines 30-33) and a reservoir for storing hydrogen (col. 14, lines 34-35, 48-51) and a flexible tubing (catalytic chamber, col. 14, lines 30-33)) connecting the fresh hydride reservoir and the hydrogen storage reservoir wherein hydrogen is produced from hydride solution (col. 14, lines 40-49). Amendola et al. do not teach a metal hydride bed in second container, said contacting promoting a reaction between in said slurry, said reaction producing

atomic hydrogen and byproducts, wherein at least a portion of said atomic hydrogen is absorbed and stored by said metal hydride bed.

Peterson et al., however, teach a process for recovering hydrogen comprising a metal hydride bed that absorbs hydrogen then vents the hydrogen as a hydrogen rich stream (col. 4, lines 58-61).

Therefore, it would have been obvious to one of ordinary skill in the art to provide the metal hydride bed in Amendola et al. in order to absorb hydrogen and vent a hydrogen rich stream as taught by Peterson et al. (col. 4, lines 58-61) in a similar process for producing and storing hydrogen.

As to claims 2, 3, 6, 7, and 11; Amendola et al. teach a chemical hydride slurry comprising sodium borohydride or potassium borohydride or lithium borohydride as the metal hydride (col. 3, lines 50-60), sodium hydroxide or lithium hydroxide or potassium hydroxide as the stabilizing agent (col. 5, lines 5-10) and water (col. 4, lines 36-37). Amendola et al. also teach venting hydrogen to a hydrogen storage tank (col. 14, lines 48-51).

As to the limitations in claim 4, Amendola et al. teach a process for producing hydrogen as described above but fail to teach pumping said slurry and said byproducts from said second container into said first container through a second flow communication between said first container and said second container. Peterson et al., however, teach that the pump can reverse direction to empty the catalyst changer (col. 14, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art to provide the process of draining the catalyst chamber (col. 14, lines 10-15) in the

metal hydride bed process in order to control the process of producing hydrogen in a similar process as the applicant.

Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Rosner (U.S. 5228529).

Amendola et al. teach a process for recovering hydrogen as described above. Amendola et al. fail to teach a process in which pumping said slurry from said first container to said second container until said slurry is free of hydrogen and a valve set in first flow communication when said slurry is free of hydrogen.

As to claim 5, Rosner, however, teaches a process for producing hydrogen gas in which the magnesium anode is depleted of hydrogen in the process of producing hydrogen (col. 4, lines 47-52) for the purpose of carrying out the process to completion.

Therefore, it would have been obvious to one of ordinary skill in the art to have provided the depletion of the starting material with hydrogen content in Amendola et al. in order to carry out a similar process to completion as taught by Rosner.

As to claim 13, Rosner teaches control valves in the apparatus of figure 1 for the purpose of controlling flow of gases through the conduits (col. 6, lines 58-64).

Therefore, it would have been obvious to one of ordinary skill in the art to have provided control valves in the process of Amendola et al. in order to control the flow of streams in the apparatus (col. 6, lines 58-64) as taught by Rosner.

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Ovshinsky et al. (U.S. 5277999).

Amendola et al. teaches a process for producing hydrogen as described above. Amendola et al. fail to teach hydrogen storage material comprising an alloy selected from AB, A_2B, AB_2, and AB_5; and Mg-Ni, Mg-Cu, Ti-Fe, Ti-Ni, Mm-Co, Ti-Mn, Ti-V, Ti-Cr, and Mn-Ni based alloys and $Ti_{Q-Z}Zr_XMn_{Z-Y}A_Y$ wherein A comprises at least one of V, Cr, Fe, Ni, or Al, wherein Q is between 0.9 and 1.1, X is between 0.0 and 0.35, Y is between 0.6 and 1.8, Z is between 1.8 and 2.1.

Ovshinsky et al. teach alloys comprising A_2B, AB_2, and AB_5 (col. 8, lines 65-66) and alloys comprising V-Ti based allows including $V_{18}Ti_{15}Zr_{18}Ni_{29}Cr_5Co_7Mn_8$ (col. 9, lines 20-34) that exhibit extremely high storage capacity (col. 9, lines 4-7).

Therefore, it would have been obvious to one of ordinary skill in the art to have provided the afore mentioned hydrogen storage materials (col. 9, lines 20-34) in Amendola et al. in order to carry out a process with extremely high storage capacity (col. 9, lines 4-7) as taught by Ovshinsky et al.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Werth (U.S. 5690902).

Amendola et al. teach a process for producing hydrogen as described above. Amendola et al. fail to teach forcing unabsorbed hydrogen to a fuel cell.

Werth, however, teaches a process for producing hydrogen (col. 1, lines 11-15) and that it is well known to use hydrogen generated for supplying a fuel cell (col. 9, lines 25-30). Therefore, it would have been obvious to one of ordinary skill in the art to have provided hydrogen being supplied to a fuel cell in Amendola et al. in order to supply hydrogen to a well known apparatus (fuel cell, (col. 9, lines 25-30) in a similar process for producing hydrogen as taught by Werth.

Response to Arguments

Applicant's arguments filed on February 7, 2006 have been fully considered but they are not persuasive.

Applicant argues that Amendola et al. and Peterson et al. either alone or in combination do not teach a process for charging a metal hydride bed from chemical hydride slurry or a metal hydride bed serving two functions as presently claimed. This argument is not persuasive for the following reason: Amendola et al. teach a process wherein a chemical hydride reacts with water to produce hydrogen gas (col. 3, lines 35-63). Amendola et al. also teach wherein hydrogen can be stored in a hydrogen storage tank after being produced from chemical hydride and water reaction (col. 14, lines 46-51). From this disclosure, Amendola et al. teach the first part of the invention wherein catalyzing the reaction of the chemical hydride slurry with water to produce hydrogen. Peterson et al. teach a metal hydride adsorption process for hydrogen purification wherein an impure feed stream to a metal hydride bed whereby the hydrogen isabsorbed from the feed stream and stored in metal hydride form, the hydrogen sotred in metal hydride form is then desorbed from the hydrogen storage alloy

and is recovered as a hydrogen product stream and impurities (col. 4, lines 5-24). From this disclosure, Peterson et al. teach wherein a metal hydride bed is to absorb and store hydrogen. The motivation for combination of Amendola et al. and Peterson et al. is the fact that Amendola et al. calls for a way to store hydrogen produced by the reaction of chemical hydride and water. Peterson et al. meets this limitation by teaching a metal hydride bed is to absorb and store hydrogen.

Applicant argues that the '033 reference does clearly suggest that the hydrogen can be stored in a separate storage tank from the disclosure on column 14, lines 50-51.

This argument is not persuasive for the following reason: In the disclosure of '033 on column 14, lines 49-50, the following is stated: "the waste reservoir can also store hydrogen". The mere fact that the disclosure states: "hydrogen can be vented off from the waste reservoir to a separate hydrogen storage tank" does not preclude the fact that hydrogen can be stored in the waste reservoir.

Applicant argues that the '806 reference teaches that hydrogen produced from a separate reaction process can be stored by the use of hydrogen storage tanks.

This argument is not persuasive for the following reason: The '806 reference is relied upon to teach that the metal hydride bed can adsorb hydrogen and vent hydrogen (col. 4, lines 58-61). This teaching is combined with the '033 reference which teaches a metal hydride in contact with a catalyst system. The '809 reference is not relied upon to teach how or where the hydrogen is produced. In response to applicant's arguments

against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that the combined teachings of the '033 and '809 references would include a slurry storage tank 30, a reaction tank 70, and a hydrogen storage alloy tank for hydrogen storage.

This argument is not persuasive for the following reason: The '809 reference is relied upon to teach that it is known to adsorb hydrogen using a hydride bed. This is combined with the '033 reference in which it is disclosed that the borohydride is contacted with catalyst system in the reaction chamber (col. 14, lines 10-14). After contacting the catalyst, the hydrogen is then adsorbed to the metal hydride at least partially in the reaction chamber to maintain hydrogen pressure in the apparatus. The teaching of the '809 reference as to the metal hydride bed adsorbing hydrogen is combined with the '033 reference to render the claimed invention obvious. In response to applicant's argument that the combination of the '809 and the '033 references teach a slurry storage tank 30, a reaction tank 70, and a hydrogen storage alloy tank for hydrogen storage, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Wartalowicz whose telephone number is (571) 272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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November 12, 2006

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